

# 2016 UDOT RESEARCH PROBLEM STATEMENT

\*\*\* Problem statement deadline is March 14, 2016. Submit statements to Tom Hales at [tahales@utah.gov](mailto:tahales@utah.gov). \*\*\*

**Title:** Assessing Prevalance and Countermeasures for Motorcycle Crashes in Utah

**No. (office use):** 16.03.07

**Submitted By:** Daniel J. Fagnant

**Organization:** University of Utah

**Email:** dan.fagnant@utah.edu

**Phone:** 801-585-2877

**UDOT Champion (suggested):** Scott Jones

**Select One Subject Area**

☐ Materials/Pavements

☐ Maintenance

☒ Traffic Mgmt/Safety

☐ Preconstruction

☐ Planning

☐ Public Transportation

## 1. Describe the problem to be addressed.

Motorcycle crashes are rare events with severe outcomes. This makes future motorcycle collisions frustratingly hard to pinpoint with hot-spot analysis utilizing historical crash data. Moreover, since riders comprise different portions of the traffic stream at different locations, a fixed share of an overall crash rate obtained from a safety performance functions will likely result in marginally accurate results. While much existing work has been conducted surrounding the topic of motorcycle crash severity estimation, much less has focused on the problem of frequency. Furthermore, the models developed in such existing studies (e.g., Schneider et al.'s evaluation of curves on rural 2-lane highways in Ohio) may not be appropriate for direct application in Utah, given Utah's mountainous terrain and high attractiveness of many scenic riding routes. Therefore, this research proposes to develop methods to identify locations in Utah where motorcyclists are at increased crash risk, and to recommend proposed countermeasures to address such risks.

## 2. Explain why this research is important.

In 2014 motorcyclists made up 17.5% of Utah road fatalities, with total crashes increasing 52% from the average across the prior 8 years. While the total number of fatal motorcycle crashes fell 20% in 2015 (accounting for 14% of all fatal crashes that year), this remains a troubling trend. Data for where motorcyclists are crashing is currently available from motor vehicle collision reports, but predicting future collisions can be quite difficult due to the rare and semi-random nature of crashes, low share of motorcyclists as a proportion of the total traffic stream, and lack of motorcycle count data. Reducing the number of motorcycle crashes has been identified as a safety priority for the state of Utah.

## 3. List the research objective(s):

1. Identify characteristics of roadways in Utah associated with high crash rates.
2. Identify locations in Utah where expected motorcycle crash rates appear excessively high.
3. Identify motorcycle crash countermeasures, and propose prioritization for countermeasure implementation.

## 4. List the major tasks:

1. Literature synthesis. Identify, review, and critically synthesize relevant published literature regarding motorcycle crash prediction estimation, as well as estimation methods used for other sparse collision data (e.g., pedestrians, cyclists). The literature review will also include an assessment of motorcycle crash countermeasures, and how they might be applied by UDOT and/or the Utah Highway Safety Office.
2. Preliminary motorcycle crash data assessment. Identify key settings where raw numbers indicate that motorcycle crashes are over-represented (e.g., rural 2-lane road segments, urban signalized intersections, etc.) With consultation of the Technical Advisory Committee (TAC), select one or two key settings for further detailed analysis.
3. Development of statistical models to identify risk factors. One or more crash count estimation models will be developed in order to estimate the motorcycle crash likelihood in the key settings previously selected in Task 2.
4. Application of risk factor estimation to selected locations. The crash likelihood model(s) developed in Task 3 will be applied broadly across regions or facilities where motorcycle crashes appear over-represented. Using these models, segments and/or intersections may be identified that appear at higher risk to experience future motorcycle collisions.
5. Identification of potential countermeasures. Relevant countermeasures identified in Task 1 will be paired with high-risk motorcycle crash locations identified in Task 4. Application of countermeasure-location pairings will be prioritized and ranked in terms of estimated location risk, anticipated cost, and expected countermeasure effectiveness.

6. Submit final report. A Final Report will be prepared and submitted that documents the entire research effort, including literature synthesis, preliminary crash data assessment, development and application of statistical models, identification of counter measures. This work shall also incorporate feedback received from the TAC prior to submittal. Task 6 activities will follow UDOT Research Division's Final Report Process.

### 5. List the expected results:

1. Assessment of expected motorcycle crash rates on key setting types in Utah. This may be disaggregated by crash type (e.g., total, multi-vehicle, angle, run-off-road, etc.) and will likely be realized in the form of one or more safety performance functions.
2. Application the motorcycle crash rates across Utah in regions with high overall motorcycle collision rates.
3. Identification of locations with high expected future motorcycle crash rates, and prioritization of possible countermeasures for such locations.

### 6. Describe how this research will be implemented.

Findings will be presented to UDOT transportation safety staff, as well as potentially staff from the Utah Highway Safety Office. These individuals may use the information stemming from this research in order to understand which areas may be at higher risk of motorcycle crashes, and potential countermeasures to address them.

### 7. Requested from UDOT: \$50K

Other/Matching Funds: \$40K\*

Total Cost: \$90K\*

A proposal for the \$40K in matching funds will be submitted to the Mountain Plains Consortium, the U.S. DOT Regional University Transportation Center for Federal Region 8, which shall be used to supplement this work through motorcycle count estimation activities.

(or UTA for Public Transportation)

### 8. Outline the proposed schedule, including start and major event dates.

The proposed timeline will begin Sept. 1, 2016 and end Dec. 31, 2017, with major tasks as follows:

- Task 1 Synthesize literature (2 months): Sept. 1, 2016 – Oct. 31, 2016
- Task 2 Preliminary motorcycle crash data assessment (2 months): Nov. 1, 2016 – Dec. 31, 2016
  - Meeting with TAC around Dec. 15
  - Technical memorandum detailing outcomes of first two tasks, Dec. 31
- Task 3 Development of statistical models to identify risk factors (4 months): Jan. 1, 2017 – April 31, 2017
- Task 4 Application of risk factor estimation to selected locations (3 months): May 1, 2017 – July 31, 2017
  - Meeting with TAC around July 1
  - Technical memorandum detailing outcomes through Task 4, July 31
- Task 5 Identification of potential countermeasures (3 months): Aug. 1, 2017 – Oct. 31, 2017
- Task 6 Submit final report (2 months): Nov. 1, 2017 – Dec. 31, 2017